7-7-2000

DDASaccident313

Humanitarian Demining Accident and Incident Database
AID

DDAS Accident Report

Accident details

Report date:	19/05/2006	**Accident number:**	313
Accident time:	10:20	**Accident Date:**	07/07/2000
Where it occurred:	Lurio River Bridge, (Cabo Delgado)	**Country:**	Mozambique
Primary cause:	Field control inadequacy (?)	**Secondary cause:**	Inadequate equipment (?)
Class:	Excavation accident	**Date of main report:**	08/07/2000
ID original source:	GZ/AVS2001:MZ02	**Name of source:**	HT (field): IND 133
Organisation:	Name removed		
Mine/device:	PMN AP blast	**Ground condition:**	bridge and surrounds metal scrap route (verge) trees
Date record created:	20/02/2004	**Date last modified:**	29/02/2004
No of victims:	1	**No of documents:**	1

Map details

Longitude:	39° 50' 62" E	**Latitude:**	13° 40' 89" S
Alt. coord. system:		**Coordinates fixed by:**	
Map east:		**Map north:**	
Map scale:		**Map series:**	
Map edition:		**Map sheet:**	
Map name:			

Accident Notes

inadequate metal-detector (?)

inadequate medical provision (?)

inadequate area marking (?)

inadequate equipment (?)

disciplinary action against victim (?)

handtool may have increased injury (?)

squatting/kneeling to excavate (?)

use of pick (?)

Accident report

The national MAC made available a summarised accident report during 2002. Their accident report is dated 14/07/00 and followed a MAC site visit made on 13/07/00. That report referred to an attachment which was the demining NGO's internal investigation. The demining NGO involved had made available their internal investigation report during 2001. The report is reproduced in full below, edited for anonymity.

1. General

1.1 Ponte Rio Lurio is at the border between Nampula and Cabo Delgado provinces, and carries the main Nampula/Pemba road across the Rio Lurio. This is the only major road link between the two provinces, and is a natural focal point for both travellers and the local population trying to access the river banks for farming and the river itself for water. During the Civil War extensive fenced minefields were laid by FRELIMO around the ends of the bridge in an attempt to deter sabotage attempts by RENAMO on the bridge structure itself. The mines now border the main road and extend to within metres of occupied housing and machambas. They currently threaten the local population and have caused both human and animal casualties during the recent past.

1.2 Initial clearance was conducted on the southern side of the bridge during 1997/98, as the 2nd priority task on the Nampula PPWP. The task was suspended after 20,107 square metres of ground had been cleared of 47 Soviet PMN AP blast mines, 76 Portuguese M966 AG mines and four mixed items of UXO. Phase 2 work began on the Northern, Cabo Delgado, side of the bridge when Team 7 deployed on the task on 10th May 2000. The task is priority 8 on the Cabo Delgado PPWP, and is expected to have similar impact as the previous work on the opposite river bank. On 7th July 2000 work was halted after a deminer accidentally detonated an explosive device whilst working in his lane.

1.3 An internal accident investigation was conducted over 7/8th July 2000. The following personnel were involved: Mozambique Country Manager, Cabo Delgado/Niassa Programme Manager, Zambezia Programme Manager.

1.4 As well as a detailed scrutiny of the accident site, interviews were conducted with the following personnel: Team 7 Supervisor, Trainee Assistant Supervisor, Team 7 Medic, Team 7 Deminer – Victim, Team 7 Deminer – witness adjacent lane, Team 7 Deminer – witness Adjacent lane.

1.5 A representative of the IND [MAC] conducted a separate visit to the accident site on 13th July 2000. He was briefed on the details of the accident by the Team 7 Supervisor.

2. Events leading to the accident

2.1 Team 7 began work on the Northern, Cabo Delgado, side of the bridge on 10th May 2000. The soil around the bridge has a medium laterite content necessitating clearance by the use of a combination of detector and excavation. It was strongly suspected that the main minefield would be marked by a barbed-wire perimeter fence (as was previously found on the Nampula side of the bridge). The plan was to use 2m wide breach lanes to locate the wire, after which full clearance was to be conducted.

2.2 The team were all made fully aware of threat from both AP and AG mines, and by 7th July two M969, one POMZ-2 and six OZM-4 had been safely located and destroyed. The AP mines were located close to the main road and outside the wire, whilst the AG mines were found following in a line up the middle of 2 distinct barbed-wire obstacles running along the ground and spaced a approximately 1m apart. This means that a total of five different types of mine have so far been located around the bridge (OZM-4, M966, POMZ-2, PMN, M969).

2.3 Clearance in lane 7 had reached the barbed-wire perimeter, which consisted of two distinct parallel lines of barbed-wire running 1m apart. Each line was made up of between one and four strands of wire grouped together. At some points some strands of the wire were missing or displaced, but a general pattern was thought to be emerging. By the time 26m of parallel wire in lane 7 had been investigated, two OZM-4 bounding mines had been located (see detailed sketch map at Annex B) [Not made available]. In both cases trip wires had been attached to the barbed-wire and then anchored off.

2.4 On 7th July 2000, the victim was continuing his clearance along the wire. He later stated that he used the combination method to clear a lane 5m down the left side. The ground here runs down in a 1:8 slope towards a large tree. On reaching the tree, the victim stopped where he could see a distinct change in the condition and the direction of the wire. The victim later maintained that both the Team Supervisor and the Trainee Assistant Supervisor then advised that he should widen the lane to 2m by clearing along the right line of wire. The victim also maintained that the Team Supervisor completed a 5m check before he moved to work in the right side lane. The victim obviously started this work, but could not explain why he did not move any of his equipment over from the left lane into his new lane. He did, however, remember moving the blue and yellow check sticks to the back of the lane before starting work (see detailed sketch map at Annex B). The victim started work in the new lane and removed a metal bracket and piece of the barbed-wire. He then did a further two check sweeps with his detector before starting excavation with his enxada (digging tool, [hoe]). On the 3rd scrape (moving from left to right) an unplanned explosion occurred which threw the victim directly backwards into the safe area behind.

3. Treatment of the casualty and subsequent evacuation

3.1 On hearing the unplanned explosion, the two deminers from adjacent lanes collected the stretcher from the medical point and moved into the victim's lane to recover the casualty. The medic waited at the top end of the lane and did not enter the minefield. On hearing the explosion the Team Supervisor states that he radioed from his position at the other side of the minefield that demining should stop. Meanwhile the two deminers now in the victim's lane reached the casualty. They both remember seeing a cloud of white smoke still hanging in the air around and on top of the lower legs of the victim, who was lying on his back. The victim was recovered to the stretcher before being moved out of the demining lane. The Team Supervisor and the medic met the victim at the start of the lane where they began assessing the nature of his injuries.

3.2 The second medic was quickly moved from the Control Point (CP) to the victim in the team vehicle along the track running to the rear of the demining lanes. Both medics then began giving first aid as follows:
Cleaned and dressed wounds to left hand and lower face.
Inserted a cannula, set up an IV giving set and began to administer 500ml of Ringers solution.
Administered 10mg of Nubain (pain relief drug) via the cannula.
Administered 10ml of Crystapen (liquid antibiotic) via the cannula.

3.3 By 10:45 hours the victim had been loaded into the recovery vehicle. Also by this time the initial accident report radioed to headquarters at 10:25 had been assessed by the Country Manager. It was decided that due to the victim's condition (reported as stable) it would be more beneficial to move him directly to Nampula main hospital rather than to Pemba, as was in the team plan. This decision was largely taken because one of the group's ambulances, that could speed up the recovery time, was known to be ready to move from HQ. The group's Mozambique ambulances had recently been governed up to 80kph, which is 15kph faster than the group's normal speed-limited vehicles.

3.4 The team vehicle, with the victim on board, met the ambulance at 12:47at Nateke. The victim was quickly transferred to the ambulance where his condition was again assessed as stable by the Chief Medic who had deployed with the ambulance. The ambulance then returned to Nampula, arriving at the hospital at 14:25.

3.5 The victim was quickly handed over to the "accident and emergency department" where one of the demining group's Hospital Bags [of essential hospital consumables] was made available. From this point onwards it is considered that no adequate attention was given to the

casualty by the hospital staff; No doctor was on hand to examine the victim's injuries - Rather, an examination was made by a hospital medic who simply dismissed the injuries as not urgent and transferred the victim to a "post operative ward". Thus any possible repair work, such as stitching, that could have aided the victim's recovery was not carried out (see conclusion). The hospital doctor did eventually see the victim the next morning.

3.6 An expatriate doctor was able to look at the victim's injuries and give a second opinion on 13th July 2000 (see Annex F).

4. The accident investigation

4.1 The demining group's internal accident investigation took place on Friday and Saturday 7/8th July 2000. This involved a study of the site and on-site interviews by Mozambique Programme Managers on the day of the accident, and a further detailed site visit and interview with the victim the following day.

4.2 The investigation revealed that;

The deminer's injuries were caused by a Soviet PMN anti personnel blast mine which he had struck with his enxada whilst excavating at the front of his lane. The fragmentation found, together with the size and position of the crater, indicate that the mine was laid 15-20cm below the surface, in a conventionally horizontal manner (see photographs at Annex C [not made available]).

The deminer was saved from serious life threatening injury by his safety equipment; In particular his visor which was found to be shattered and scattered in all directions. The visor headband and a head scarf were found high in trees well to the rear of the seat of the explosion (see diagram photographs at Annexes B and C). No significant damage was found on his protective vest.

Injuries to the deminer's lower face were caused by the pieces of visor which he had been wearing in the correct manner. The injuries to his left hand were caused by the shattered wooden handle of his enxada which he was using to excavate with. A small point of contention is that the original accident report stated that the casualty had sustained injuries to his right hand rather than those actually to his left. Minor cuts and grazing to his left ankle and upper right arm were caused by secondary fragmentation (soil and stones) from the blast effect of the mine.

The group's Standard Operating Procedures had been broken by the deminer and both supervisory staff.

The deminer did not re-align his lane markers and tools before starting work in the eventual accident lane. An inadequate number of detector sweeps were made by the deminer before he started excavating with his enxada just prior to detonating the mine.

It is not absolutely clear what ground had been checked by the supervisory staff because the blue and yellow check sticks had been moved to the rear of the lane by the deminer before he started work in the accident lane. Three different explanations of what checks had been carried out were given by those involved.

Professional treatment of the victim and well coordinated medevac drills were not adequately followed up by Nampula hospital staff. The demining group's staff had to harass disinterested hospital staff to call in the duty doctor. A Russian doctor did finally examine the victim the day after the accident had occurred.

5. Conclusions in relation to the accident

5.1 Based on the evidence gained from interviews, consideration of the accident circumstances, and detailed assessment of the site, the following conclusions are drawn:

- Complacency and slack demining are indirectly the most likely cause of the accident. A contributing factor to this would appear to be a lack of control through the non imposition of rigid 5m and daily checks by the supervisor and assistant supervisor. The fact that a deminer has been allowed to move

check sticks also points to a lack of general minefield discipline. No direct reason for missing the signal from a relatively high metal content AP mine can be established. The victim was demining along a confirmed line of mines and should have been more aware of danger.

- The shattering effect on the victim's visor may well have been caused by a large piece of his enxada blade which was taken off by the blast. It may have struck the visor and caused the shattering, before itself being deflected away (it should be noted that shattering of the visor is not a usual occurrence). Had the victim's visor not been worn correctly then it is likely that his facial injuries would have been far more serious than the small cuts and grazes that he actually sustained.
- The well conducted initial treatment of the casualty, relatively fast casevac, hospital pre-warning and supply of the group's hospital bag would have been of little consequence had the victim's injuries been more serious. This is because the hospital staff were not ready or particularly concerned. Casevac needs to be followed up by timely and appropriate action by the hospital. The demining group's HQ staff need to make sure that a doctor has seen the victim and given a clear diagnosis of the extent of the injuries, and that subsequent treatment is being given. Treatment should not be left in the hands of disinterested local hospital staff.

6. Summary actions

6.1 Demining should continue only after all teams have carried out retraining on the combination method of detection. (Completed 10th July 2000)

6.2 Provisional Operations Managers (POMs) are to ensure that the 5m check system is understood and carried out by all demining teams. 5m checks must be carried out by the assistant supervisor before a deminer can move on (marked with yellow stick). Team supervisors must have completed a check of all clearance conducted by the end of a working day (marked with blue stick). Deminers should only move sticks 1m back, or to one side, out of the way if they are restricting work.

6.3 Disciplinary action is to be taken against the Team Supervisor, Assistant Supervisor and the victim for a lack of minefield discipline.

6.4 The team working at the Lurio task is to be issued with Ebinger 420 GC's (Ground Compensating) detectors in order to help with clearance.

6.5 The provincial heath administrator is to be informed of the failure of Nampula hospital to supply adequate medical attention. A clearer demining accident system is to be found. If possible the NGO's Mozambique organization should look into finding a qualified locally practicing doctor who can be on call for any emergencies. If necessary a form of payment should also be considered. [A named ex-pat doctor] (or other approved doctor) should approve selection of local doctor(s) on the next medical visit.

6.6 The shattered pieces of the victim's visor should be collected during subsequent clearance and sent to the group's HQ in UK for possible testing by the manufacturer.

Signed: Country Manager, Mozambique

Annexes referenced in the report were not made available.

The demining NGO were operating in one-man-teams, with the enhanced levels of supervision that this entails. They routinely squat or kneel to excavate. The group always wears a full-face visor and a short frontal apron when in mined areas.

An IND report was made available, but could not be copied. The accident code was 000929/Code 071. The map reference was recorded as: Lat: 13 deg 40' 89"S Long: 39 deg 50' 62"E

The report included little detail, referring the reader to the internal accident report above. The only aditional infromation was that equipment worth US$50 was damaged.

Victim Report

Victim number:	395	**Name:**	**Name removed**
Age:		**Gender:**	Male
Status:	deminer	**Fit for work:**	not known
Compensation:	not made available	**Time to hospital:**	4 hours 5 minutes
Protection issued:	Long visor Short frontal vest	**Protection used:**	Long visor, Short frontal vest

Summary of injuries:

INJURIES

minor Arm

minor Face

minor Leg

severe Hand

COMMENT

See medical report.

Medical report

No formal medical report was made available.

The photograph of the victim's hand shown above was made available.

The field medics reported giving first aid as follows:

Cleaned and dressed wounds to left hand and lower face.

Inserted a cannula, set up an IV giving set and began to administer 500ml of Ringers solution.

Administered 10mg of Nubain (pain relief drug) via the cannula.

Administered 10ml of Crystapen (liquid antibiotic) via the cannula.

The accident occurred at 10:20 and the ambulance arrived at the hospital at 14:25.

The hospital doctor eventually saw the victim the next morning.

The victim suffered minor cuts and abrasions to the face and damage to his hand, leg and arm.

Analysis

The primary cause of this accident is listed as a *"Field control inadequacy"* because it seems that the victim was working in breach of his SOPs and his errors were not corrected. The secondary cause is listed as *"Inadequate equipment"* because the methods used and equipment available were not appropriate, and the provision of appropriate equipment from detector to ambulance is a management responsibility.

The detector in use was not suitable for use in mineralised soil (as recognized by the decision to use ground-compensating detectors in the internal report) and the quality of the enxada was poor because it broke up in the accident.

The use of some kind of pick-axe or hoe is not unusual when conducting area-excavation. The tool is swung in at a low angle and used to shave the face of the excavation in a slow advance. This is the third of three accidents involving this demining NGO and an enxada in Mozambique. See the accidents on 14th April 1998 and on 7th June 2000.

A photograph of an enxada is shown above. Locally made, the quality of steel and handle is very variable.

While the use of the tool may be accepted, the quality of the tool being used was clearly inadequate. Hardened steels will crack and shatter in a blast, which appears to have happened in this case. If the blade and the handle were made as one using a medium grade of steel, the tool would be far less likely to shatter and cause injuries – as it apparently did in this case.

The failure of the group's management to provide an on-site ambulance is most surprising. The victim was evacuated in the Team vehicle and driven over bad roads for two hours before meeting an ambulance coming the other way. After a further hour and a half, the victim arrived in hospital where he was not examined by a doctor until the next day.

The internal investigating team recognized that the performance of the hospital was unacceptable but did not acknowledge that the group's failure to provide a dedicated on-site ambulance was "unusual" to the point of being almost unique amongst professional groups in Humanitarian Demining.